

# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/GB2004/004334

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G02B6/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G02B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)  
EPO-Internal, INSPEC, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category \* Citation of document, with indication, where appropriate, of the relevant passages

Relevant to claim No.

X DE 101 55 492 A (UNIV SCHILLER JENA)  
9 October 2003 (2003-10-09)  
figures 1.3-5

X STOYANOV N S ET AL: "Terahertz polariton  
propagation in patterned materials"  
NATURE MATERIALS NATURE PUBLISHING GROUP  
UK,  
vol. 1, no. 2,  
2 September 2002 (2002-09-02), pages  
95-98, XP002311335  
ISSN: 1476-1122  
page 97; figures 1-3

1-25,  
46-59

1-25,  
46-59

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another claim or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"A" document member of the same patent family

Date of the actual completion of the international search

10 January 2005

Date of mailing of the international search report

28.04.2005

Name and mailing address of the ISA  
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		Relevant to claim No.
Category *	Citation of document, with indication, where appropriate, of the relevant passages	
X	<p>WILL M ET AL: "Properties of waveguides manufactured with fs-laser pulses in transparent materials" CONFERENCE ON LASERS AND ELECTRO-OPTICS. (CLEO 2001). TECHNICAL DIGEST. POSTCONFERENCE EDITION. BALTIMORE, MD, MAY 6-11, 2001, TRENDS IN OPTICS AND PHOTONICS. (TOPS), US, WASHINGTON, WA : OSA, US. vol. VOL. 56, 6 May 2001 (2001-05-06), pages 491-491, XP010560103 ISBN: 1-55752-662-1 figure 1</p>	1-25, 46-59
X	<p>KAWAMURA K-I ET AL: "HOLOGRAPHIC ENCODING OF PERMANENT GRATINGS EMBEDDED IN DIAMOND BY TWO BEAM INTERFERENCE OF A SINGLE FEMTOSECOND NEAR-INFRARED LASER PULSE" JAPANESE JOURNAL OF APPLIED PHYSICS, PUBLICATION OFFICE JAPANESE JOURNAL OF APPLIED PHYSICS. TOKYO, JP, vol. 39, no. 8A, PART 2, 1 August 2000 (2000-08-01), pages L767-L769, XP002937377 ISSN: 0021-4922 figure 1</p>	1-25, 46-59
P,X	<p>GUI LI ET AL: "Refractive index change in lithium niobate induced by focused femtosecond laser" PROC SPIE INT SOC OPT ENG; PROCEEDINGS OF SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING; INTEGRATED OPTICS: DEVICES, MATERIALS, AND TECHNOLOGIES VIII 2004, vol. 5355, 2004, pages 22-32, XP002311337 pages 22-32; figure 1</p>	1-25, 46-59
A	<p>US 2002/076655 A1 (BORRELLI NICHOLAS F ET AL) 20 June 2002 (2002-06-20) figures 1,2,4,11a</p>	1-25, 46-59
A	<p>HIRAO K: "INTERNAL MODIFICATION OF GLASS MATERIALS WITH A FEMTOSECOND LASER" PROCEEDINGS OF THE SPIE, SPIE, BELLINGHAM, VA, US, vol. 4088, 2000, pages 33-39, XP009009885 ISSN: 0277-786X figures 1,10</p>	1-25, 46-59

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>NOLTE S ET AL: "Waveguides produced by ultrashort laser pulses inside glasses and crystals"</p> <p>PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING SPIE-INT. SOC. OPT. ENG USA, vol. 4637, 21 January 2002 (2002-01-21), pages 188-196, XP002311336</p> <p>ISSN: 0277-786X</p> <p>figure 1</p>	1-25, 46-59
A	<p>US 2001/021293 A1 (KOUTA HIKARU ET AL)</p> <p>13 September 2001 (2001-09-13)</p> <p>figure 1</p>	1-25, 46-59

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## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; It is covered by claims Nos.:  
1-25, 46-59

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-25, 46-59

A method of altering the refractive index of a material comprising focusing a pulsed laser beam within the material and moving the beam along a paths such that a region of altered refractive index is formed along the path, a material made in this manner suitable for use as a cavity of a laser.

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2. claims: Claims 26-45, 60-61

A crystal suitable for use in a laser comprising an inscribed structure which has a different refractive index to the rest of the crystal and a laser formed by waveguide inscribed in a crystal of YAG lodged with Nd3+.

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3. claim: 62

A laser formed by an effective waveguide having a cladding of depressed refractive index.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 10155492 A	09-10-2003	DE 10155492 A1	09-10-2003
US 2002076655 A1	20-06-2002	AU 6382700 A	19-02-2001
		BR 0012797 A	15-07-2003
		CA 2380541 A1	08-02-2001
		CN 1365500 A	21-08-2002
		EP 1204977 A1	15-05-2002
		JP 2003506731 T	18-02-2003
		WO 0109899 A1	08-02-2001
		US 6573026 B1	03-06-2003
		AU 6612900 A	25-06-2001
		WO 0144871 A1	21-06-2001
US 2001021293 A1	13-09-2001	JP 3531738 B2	31-05-2004
		JP 2001311847 A	09-11-2001